REMARKS

Claims 1-25 stand rejected in the outstanding Official Action. Claim 1 is amended and, as such, claims 1-25 remain in this application.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page/s is/are captioned "**Version With Markings To Show Changes Made**."

The Examiner's acknowledgment of applicants' priority claim and receipt of the certified copy of the priority document is appreciated. Additionally, the Examiner's consideration of the prior art submitted with applicants' Information Disclosure Statement is also appreciated.

Applicants enclose herewith proposed drawing corrections to Figures 1 and 2 in this application. Although not objected to in the outstanding Official Action, normal Patent Office practice requires the labeling of rectangles in drawings. Additionally, Figure 2 involves three separate but related drawings and applicants have relabeled Figure 2 as Figures 2a-2c. Applicants have amended the specification in the Brief Description of the Drawings to refer to Figures 2a through 2c and has similarly amended the references to Figures 2a through 2c on pages 8 and 9 of the specification.

Upon approval of these proposed drawing corrections and receipt of a Notice of Allowance, applicants will correct the formal drawings in this application. Any drawing correction requirement prior to receipt of a Notice of Allowance is respectfully requested to be held in abeyance.

Claim 10 stands rejected under 35 USC §112 as indefinite. Specifically, the Examiner suggests that the language in claim 10 "said images are displayed as calibrated spacial thermal images" is believed indefinite. The Examiner's basis for considering this language indefinite is not understood. Claim 10 ultimately depends from claim 1 (through claim 3) and claim 1 specifies that there is a "thermal imaging system to detect and display the intensity of heat emanating from said wire or cable." Claim 3 specifies that there are images "displayed by the thermal imaging system." Claim 10 adds the additional limitation that "said images" are displayed in a certain fashion, i.e. as "calibrated spacial thermal images."

Because "thermal images" is in a previous claim, the only alleged indefinite material in claim 10 is the use of the words "calibrated" and "spacial" to further limit the "thermal images."

A. "Calibrated"

Those having ordinary skill in the art to which the present invention pertains will understand and appreciate that Figures 2b and 2c disclose a graph of heat intensity with respect to a datum level which is the level where "the insulation of the wire 12 is undamaged" (page 9, lines 5-6, with respect to Figure 2b and lines 15 and 16 with respect to Figure 2c). Inasmuch as the detected heat from breaks in the insulation is greater than the established datum level 16, the displayed images are "calibrated" in the ordinary sense of the word.

B. "Spatial"

Inasmuch as the images displayed in Figures 2b and 2c are indicative of two spaced-apart insulation defects, the images are spacial and therefore indicative of the location of insulation defects.

Thus, applicants' invention, as discussed in the specification and shown in the figures, provides images which are displayed as "calibrated spacial thermal images." There is nothing indefinite to one of ordinary skill in the art about the adjectives "calibrated" and "spacial." The phrase "thermal images" has clear antecedent basis in the claims from which it depends. As a result, there is no basis for the Examiner's conclusion that the phrase "calibrated spacial thermal images" is in any fashion indefinite to one of ordinary skill in the art and any further rejection thereunder is respectfully traversed.

Claims 1, 2, 4-7 and 12-15 stand rejected under 35 USC §103 as being unpatentable over Elabd (U.S. Patent 4,584,523) in view of Wood (U.S. Patent 4,473,795). The invention as set out in claim 1 is a method of inspecting the integrity of insulation in an insulated wire or cable. The three recited method steps are

(a) passing a current through the wire or cable;

(b) applying a fluid having electrolytic properties to the wire or cable; and

(c) using a thermal imaging system to detect and display the intensity of heat emanating from the wire or cable.

With respect to the Elabd reference, the Examiner's admission that Elabd fails to teach any leakage current measuring means and also fails to teach "a fluid having electrolytic properties" is very much appreciated (the admission being made on page 3, lines 5 and 6 of the Official Action). However, the Examiner should also admit that

Elabd is not related to wires or cables which are insulated. In fact, the wires and cables in Elabd are uninsulated power transmission lines.

Should the Examiner contend that insulators 11 and 12 comprise insulation of an "insulated wire or cable," there is clearly no disclosure in Elabd of measuring any heat or current passing through the insulator. Instead Elabd is a high voltage, high amperage electric power transmission line and the problem to be solved is the measurement of current flow in that transmission line. The current flow is measured by measuring the heat in terms of infrared radiation from the active lines as compared to a reference line carrying no current. Thus, Elabd is not concerned with the problem to be solved by applicants' invention, nor does it disclose the method steps of applicants' inventive method.

In fact, Elabd specifically teaches away from applicant's invention, at least to those having ordinary skill in the art to which this patent is directed. Applicants' claim 1 specifically recites the method step of applying a fluid "having electrolytic properties" to the wire or cable such that small failures in the cable insulation allows a leakage current to generate heat which can be detected and displayed by a thermal imaging system. If such electrolytic fluid were somehow sprayed or coated on the high voltage high amperage power transmission lines, the probable result would be a direct short (through the fluid to ground) and most probably a power failure of the entire system. Those having ordinary skill in the art would know that you never want to apply any sort of electrolytic material to a bare power transmission line because of the danger of a short, which as a minimum could disrupt power transmission and in a severe case could actually

electrocute the person spraying or applying the electrolytic fluid. Clearly, Elabd would lead one of ordinary skill away from applying an electrolytic fluid to a cable, whether or not it is insulated.

The Examiner, without regard to the fact that Elabd teaches away from applicants' claim 1 method, suggests that the Wood reference somehow teaches the missing method step of applying the electrolytic fluid to the insulated wire or cable. Again, it is noted that Wood is not related to an insulated wire or cable and does not apply any current to its conductive substrate. Rather, Wood uses IR radiation 28 from a scanning light beam, which, when passing through pin hole 16, generates an electric current which passes between substrate 10 and the electrolyte 18. Thus, it is the light beam on the electrolyte in the vicinity of the pin hole which causes current to flow as measured by ammeter 26 (see the sentence bridging columns 3 and 4 of the Wood patent).

If the teaching of the Wood patent were applied to applicants' claim 1 invention, the insulated wire or cable would have to be suspended in the electrolytic fluid, light would have to illuminate any defect in the non-existent insulation" and a change in current between the wire and the electrolyte caused by the light illuminating a cable defect would have to be measured. This of course teaches directly away from any use of a thermal imaging system to detect or display the intensity of heat emitted from the wire or cable in the vicinity of an insulation defect. Wood clearly teaches away from any such measurement.

Inasmuch as neither prior art reference relates to insulated wires or cables or the problem of testing the integrity of insulation on insulated wires or cables, they are not

combinable. Further, the Examiner ignores that which would be patently obvious to those having ordinary skill in the art, i.e., one would not apply an electrolytic fluid to the power transmission lines in Elabd and that there would be no heat emanating from the substrate which would be capable of being thermally imaged in the Wood patent.

The Court of Appeals for the Federal Circuit has consistently held that the burden is on the Patent Office to establish not only that the prior art references teach all elements of the claimed method, but also that there is some reason or motivation which would cause one of ordinary skill in the art to combine the references. Here, the Patent Office has failed to provide any basis for concluding that the method steps are shown in the prior art reference or that there is any reason or motivation for combining these references. In fact, applicants have pointed out that one of ordinary skill in the art would clearly be led away from any such combination in view of the disclosure contained in the Elabd and Wood references.

With respect to claim 15, the Examiner suggests that "Official Notice" is taken that the use of an oscilloscope is well known and expected in the art. Pursuant to the provisions of the Manual of Patent Examining Procedure (MPEP) Section 2144.03, applicants hereby traverse the Examiner's assertion and as required by the MPEP, "the examiner should cite a reference in support of his or her position." As noted above, the Elabd and Wood references fail to disclose the method steps of claim 1 from which claim 15 ultimately depends and indeed both references would appear to lead one of ordinary skill in the art away from such a combination. Why one of ordinary skill in the art would then combine these references with the use of an oscilloscope is not apparent.

In view of the above, the Patent Office has simply failed to establish a *prima facie* case of obviousness over the Elabd and Wood references and therefore any further rejection of claims 1, 2, 4-7 and 12-15 is respectfully traversed.

Claims 3, 8-11, 24 and 25 stand rejected under 35 USC §103 as unpatentable over Elabd and Wood as previously applied and further in view of Piety (U.S. Patent 5,637,871). The Examiner admits that Elabd and Wood fail to disclose "a recording means for recording display images" or the other features of these claims. Without prejudice to pointing out further features of the claims which are not disclosed in Piety or disputing the Examiner's alleged basis for combining Piety with Elabd and Wood, applicants rely for patentability upon the patentability of claim 1, from which claims 3, 8-11, 24 and 25 depend.

Again, with respect to claims 24 and 25, the Examiner's reliance upon Official Notice is respectfully traversed and it is requested that the Examiner cite a reference demonstrating such claimed subject matter. As a result of the dependence from claim 1, the above arguments regarding the Elabd and Wood references are herein incorporated by reference. Any further rejection of these claims under the provisions of 35 USC §103 is respectfully traversed.

Claims 16-23 stand rejected under 35 USC §103 as unpatentable over Elabd and Wood as previously applied and further in view of Singh (U.S. Patent 5,624,928). Inasmuch as claims 16-23 ultimately depend from claim 1, the above comments with respect to Elabd and Wood as applied to claim 1 are herein incorporated by reference. Without prejudice to additional arguments distinguishing the Singh reference, applicants

will rely upon the patentability of claim 1 as distinguishing claims 16-23 over the Elabd/Wood/Singh combination. Furthermore, the Examiner has provided no reason or motivation for one of ordinary skill in the art to combine any aspect of Singh with any aspect of Elabd and/or Wood. None of these references are directed to solving the problem solved by applicants' claimed invention. Again, the Examiner's rejection of claim 23 is based upon "Official Notice" and that Official Notice is respectfully traversed. Again the Examiner is requested to cite a reference illustrating what he alleges to be "Official Notice."

In view of the above, there is simply no basis for combining either Elabd, Wood, Piety or Singh in any fashion, because these references all deal with problems different from those solved by the claimed invention. Those of ordinary skill in the art would not involve applicants' method step of applying an electrolytic fluid to a power transmission lines because of the obvious danger. None of the prior art suggest that there is any problem with insulated wires or cables or that applicants' method steps would solve the problem of inspecting such insulation. There is simply no basis for combining references and even if there were, the references would not illustrate or render obvious applicants' claimed invention. As a result, any future rejection of claims 1-25 is respectfully traversed.

Having responded to all objections and rejections set forth in the outstanding Official Action, it is submitted that claims 1-25 are in condition for allowance and notice to that effect is respectfully solicited. In the event the Examiner is of the opinion that a

brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact applicant's undersigned representative.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

The paragraph beginning at page 1, line 1:

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of non-destructive testing and more particularly to the use of infra-red thermography in non-destructive testing of wires and cables.

2. Discussion of Prior Art

The paragraph beginning at page 3, line 14:

The present invention seeks to overcome these problems and provide a more accurate method of determining the extent of damage to the insulation of wires and cables than hitherto known.

SUMMARY OF THE INVENTION

The paragraph beginning at page 6, line 23:

BRIEF DESCRIPTION OF THE DRAWINGS

In order to more fully understand the present invention, the following embodiments are described by way of example only and with reference to the accompanying drawings in which:

The paragraph beginning at page 7, line 1:

Figure [2] 2a shows a plan view of a loom conducting current [and].

Figures 2b and 2c show a corresponding display of heat emanating from the wire both with and without the electrolytic fluid; and

The paragraph beginning at page 7, line 4:

Figure 3 shows a flow chart of a preferred method in accordance with the present invention.

DETAILED DISCUSSION OF PREFERRED EMBODIMENTS

The paragraph beginning at page 8, line 22:

Figure [2] 2a shows a loom 27 comprising insulated wires 12, 26 positioned between a pair of connectors 25 and conducting current therebetween. Part of the insulation of the wire 12 is damaged around its circumference 13, possibly caused by the wire 12 being tied or clipped to other wires or to a structure (not shown) at that point. The wire 26 has a radial crack 14 in its insulation, possibly caused by impact from a tool (not shown) during installation of the wire.

The paragraph beginning at page 9, line 3:

A graph 15 in Fig. 2b of intensity of heat versus distance along the loom 27 prior to the addition of an electrolyte is shown as it might appear on the display apparatus. Where the insulation of the wire 12 is undamaged, the heat intensity is at a datum level 16. Where the insulation of the wires 12, 26 have been damaged 13, 14, small peaks 17, 18 may be displayed corresponding to heat emanating from the wires 12, 26 due to the

damaged insulation. Where the damage is hidden from direct view of the camera, no peaks may occur.

The paragraph beginning at page 9, line 12:

A graph 19 in Fig. 2c of intensity of heat versus distance along the [loom27] loom 27 following the addition of an electrolyte (as shown in Figure 1) is shown as it might appear on the display monitor. Where the insulation of the wires 12, 26 is undamaged the heat intensity is at a datum level 16. Where the insulation of the wires 12, 26 has been damaged at 14, a rapid temperature increase is displayed, and a higher temperature plateau 21 is shown between damage sites 13 and 14, corresponding to the heat emanating from the wires 12, 26 due to the damaged insulation and the conduction of the leakage current from the damage site 13 to adjacent damage site 14 via the electrolyte. Particularly where damage is located out of the line of sight of the detector, the addition of the electrolyte allows the leakage current to flow around the insulated wire between damage sites and so enables hidden damage sites to be detected.

IN THE CLAIMS

1. *(Amended)* A method for inspecting the integrity of [the] insulation of [a] an insulated wire or cable including the steps of;

passing a current through said wire or cable,

applying a fluid having electrolytic properties to said wire or cable, and

using a thermal imaging system to detect and display the intensity of heat emanating from said wire or cable.